

Active

Environmental Technologies Inc.

June 18, 1998

Mr. Jack Harmon
USEPA
1002 Oswego Street
Utica, NY 13662

Dear Mr. Harmon,

By way of introduction, we have been working with Mr. Art Pethybridge of SLC Constructors on a PCB decontamination project. Art suggested that I send you some information on **TechXtract**[®] chemical decontamination technology. The advantage to **TechXtract**[®], is its ability to remove contaminants from below the substrate surface. The technology has been effective on a wide variety of contaminants, including mercury, heavy metals, radionuclides, PCB's, explosives, chlorinated solvents, pesticides, and herbicides. It has been used on concrete, wood, stainless steel, copper, transite, block, and other hard surfaces. I hope you find the enclosed both interesting and useful.

- A videotape produced for the USEPA Superfund Innovative Technology Evaluation (S.I.T.E.) program. The tape discusses the use of **TechXtract**[®] for the removal of PCB's that have migrated more than 2" into the concrete. This particular evaluation was performed at Pearl Harbor with partial sponsorship by the Pacific Division Naval Facilities Engineering Command (Ann Tanaka 808-474-4504). Linda Hunter of PRC provided oversight for the EPA. (619-718-7676),
- MSDS Sheets for the three **TechXtract**[®] solutions,
- A **TechXtract**[®] qualifications package that give a brief explanation of how the technology works along with several case histories, references, and comparisons to alternate technologies.
- A scale up project for removing radionuclides from lead was completed under contract to Bechtel Hanford (Marve Hyman 509-373-2158) at the Hanford Site in Richland, Washington. A report on that project is enclosed.
- A project report describing the use of **TechXtract**[®] at Taiwan Power to remove hard fixed radionuclides.

I would be happy to answer any questions that you might have on a particular application. You can also speak with the inventor, Ron Borah (219-464-4345) who invented and patented the technology. Thank you for your interest. We look forward to working with you on a future project.

Regards,



Scott Fay
Director

Environmental Contracting

439028



Extraction Chemistry Goes Deep to Grab PCBs

This successful extraction process uses advanced chemical formulations and engineered applications.

By Michael W. Bonem and Ronald E. Borah

Effective polychlorinated biphenyl decontamination of buildings and equipment is a difficult challenge. Required cleanup levels are typically very low, with the PCB spill policy criteria of 10 micrograms (μg) per 100 cm^2 (40 CFR 761, Subpart G) applied most often. In the best circumstances, this standard is difficult to achieve, but the passage of time complicates the problem.

Over the years, PCBs and other contaminants will migrate deeper into the substrate through the pores in any material. Migration occurs naturally due to gravity and specific gravity differentials, with water from routine cleaning or with pressure. The depth to which this migration will occur depends on many factors, including the porosity of the material, the mobility and solubility of the contaminants, the presence of coatings and the existence of other drivers. Migration of 0.5 inch or more is common and can exceed 4 inches in some cases. Since many current decontamination projects are addressing incidents that occurred 20 or more years ago, deep penetration of PCBs is a widespread concern.

Standard approaches to cleanup projects include physical (destructive) methods and chemical cleaning with surfactants, solvents or acids. Physical mechanisms can be effective if the contamination is not deep and if damage to the surface is allowable. Their

primary limitations are the large volume of waste generated, the risk for workers (primarily from airborne contaminants) during the cleanup, the potential need to shut down plant operations and ongoing liability for landfill disposal. Destructive methods can also be very expensive in cases of deep contamination due to the high cost of disposal. Off-the-shelf chemicals address surface contamination but are usually ineffective when subsurface migration has occurred. In addition, many chemicals (strong acids, solvents) pose significant health and safety

Using a crew of four decontamination technicians and a project manager, the project was completed in 10 working days.

risks for remediation workers.

A sequential chemical extraction technology process, TechXtract, has been successfully used for the removal of PCBs, other hazardous organic and inorganic substances, and radionuclides from solid materials such as concrete, brick and steel.

The technology uses advanced chemical formulations and engineered applications to achieve significant penetration and removal of these contaminants from below the surface of these materials.

The process chemistry is based on sever-

al hypotheses relating to contaminant migration and removal. One hypothesis is that contaminants migrate into the pores and microscopic voids of a material, even for seemingly nonporous media. Mobility of the contaminants, time and secondary forces often drive these contaminants to deeper levels in the substrate. Furthermore, contaminants tend to become chemically or electrostatically bonded to the substrate. In many cases, the time between contamination and decontamination efforts allows the contaminant migration pathways to become partially closed. This system:

- Reopens the pores and capillary pathways to the maximum possible extent.
- Penetrates into the pores as deeply as possible.
- Breaks the substrate and contaminant bonds which may be holding the contaminants in place.
- Binds or encapsulates the contaminants to prevent recontamination.

One recent project in which the technology was employed was the decontamination of an electric utility warehouse where PCB transformers had been stored. As is often the case, the out-of-service transformers had leaked in a number of places. The warehouse was no longer in use, and the utility's objective was to reduce PCB concentrations to less than 10 $\mu\text{g}/100 \text{ cm}^2$.

The total area to be decontaminated was 6,300 square feet of concrete floor. Initial wipe samples indicated PCB concentrations ranging from less than 10 $\mu\text{g}/100 \text{ cm}^2$